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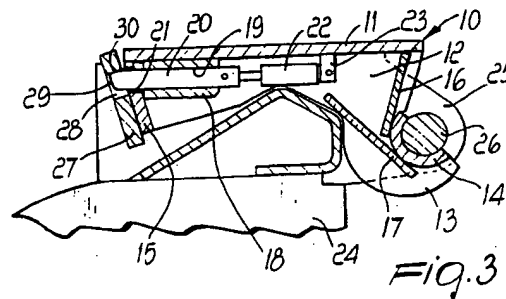
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**Self-locking quick coupling for fitting buckets or the like to earth-movers.**

A quick coupling comprising: a support (10) to be fixed to the power arm of an earth-mover; elements (12) with a hook-like end (13), suitable to fit between the upper part of a bucket (24) or the like and a transverse pivot (26) thereof, extending on one side from the arm, and means for fixing to the bucket or the like extending on the opposite side from the arm. The fixing means comprise a locking element (20) slidingly coupled to the support (18) and coupled to means (22) suitable to push it so that it fits with one end (29) in a corresponding seat (28) of a cross-member (27) protruding from the upper part of the bucket or the like. This end has, on the same side as the support, an inclined surface suitable to rest against a corresponding inclined surface of the seat.



The present invention relates to a self-locking quick coupling for fitting buckets or the like to earth-movers.

Couplings are already known which are suitable to obtain, in a simple and rapid manner, an interchangeable association between buckets of different kinds and an earth-mover, for example during excavation and earth-moving work.

A particular type of quick coupling is composed of a supporting plate which can be fixed to the power arm of the earth-mover; elements with a curved end, suitable to fit between the upper part of the bucket and a transverse pivot thereof, extend from one side of said supporting plate.

A hook-like element is articulated from the opposite side of the plate and keeps a downward-facing position by virtue of elastic elements cooperating with fixing elements.

The hook-like element is suitable to anchor and release, by rotation, a transverse element protruding from the upper part of the bucket.

Although it optimally performs its specific tasks, this type of quick coupling is not free from drawbacks, including a certain constructive complication of the part comprising the hook-like element and the onset of excessive plays between the various elements as the coupling is subjected to intense work loads.

An aim of the present invention is to provide a quick coupling for fitting buckets or the like to earth-movers which allows to eliminate the drawbacks described above in known types and which is particularly self-locking.

A further aim is to provide a quick coupling which provides for the recovery of plays as they form.

Another important aim is to provide a quick coupling characterized by easy use and by low maintenance requirements.

Another important aim is to provide a quick coupling which is easy to install and adapt on current earth-movers and on current types of buckets or the like.

Another object is to provide a quick coupling which can be manufactured at low cost with conventional production equipment.

With these and other objects in view, there is provided, according to the present invention, a quick coupling of the type comprising: a support which can be fixed to the power arm of an earth-mover; elements with a hook-like end, suitable to fit between the upper part of a bucket or the like and a transverse pivot thereof, extending on one side from said arm; and means for fixing to the bucket or the like extending on the opposite side from said arm; said coupling being characterized in that said fixing means comprise a locking element slidably coupled to said support and coupled to means

suitable to push it so that it fits with one end in a corresponding seat of a cross-member protruding from the upper part of said bucket or the like, said end having, on the same side as said support, an inclined surface suitable to rest against a corresponding inclined surface of said seat.

Further characteristics and advantages of the device according to the present invention will become apparent from the following detailed description of two preferred embodiments thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

figure 1 is a sectional view of a first embodiment of the coupling during the fitting of the arm of the earth-mover to the bucket or the like;

figure 2 is a sectional view of the part of the coupling to be fixed to the arm of the earth-mover;

figure 3 is a sectional view of the coupling with the parts mutually connected;

figure 4 is a front view of a cross-member protruding from the upper part of the bucket or the like, included in the coupling according to the invention;

figure 5 is a perspective view of the coupling with the parts mutually disengaged;

figure 6 is a sectional view of a second embodiment of the coupling, with the parts mutually engaged;

figure 7 is a sectional view of the part of the coupling of figure 6 to be fixed to the arm of the earth-mover;

figure 8 is a top view of the coupling part of figure 7 during disengagement.

With reference to the above figures 1 to 5, a self-locking quick coupling, in a first embodiment, comprises a support 10 with a metallic plate 11 on top of which wings, not shown, for fixing to the power arm of an earth-mover are welded.

Two first parallel wings 12, made of thick metal plate, are longitudinally welded below said plate 11; a hook-like end 13, curved so as to form a circular arc directed outwards, extends downwards from one end of each of said wings.

A half-shell 14, conveniently manufactured by diametrically cutting a metal pipe, is transversely welded between the ends 13.

The wings 12 are furthermore connected by strengthening cross-members, designated by the reference numeral 15 at one end and by the reference numerals 16 and 17 in the region of said ends 13.

A block 18 is welded below the plate 11, and a locking element 20 is inserted in a through hole 19 of said block which is parallel to said plate 11; said locking element also passes through a hole 21 of the cross-member 15.

Said locking element 20 is coupled to a fluid-actuated piston 22 coupled between said locking element and tabs 23 which are welded to the plate 11.

Said piston 22 is suitable to move the locking element 20.

The support 10 can be coupled to the upper part of a bucket 24 of the like, appropriately provided with a pair of second longitudinal wings 25 made of thick metal plate; a large cylindrical pivot 26 is transversely welded between said wings in the region of said hook-like ends 13, the outer surface of said pivot being complementary to that of said half-shell 14.

A cross-member 27 is welded to the bucket 24 in the region of the free end of said locking element 20; when the coupling is in closed position, said cross-member is not orthogonal to the direction of translatory motion of the locking element 20.

Said cross-member 27 has a hole 28 for the insertion of the end 29 of said locking element 20.

The walls of the hole 28 are therefore inclined with respect to the direction of translatory motion of the locking element 20.

Due to this reason, the upper surface 30 of the end 29 is inclined (chamfered) so as to rest on the corresponding upper wall of the hole 28.

As regards the steps of the fixing of the bucket 24 to the earth-mover, in a first step the hook-like ends 13 are coupled to the pivot 26 and then the support 10 is rotated about said pivot.

By actuating the fluid-actuated piston 22, the locking element 20 is caused to retract and then, once rotation is completed, is caused to move so as to enter the hole 28, completing the coupling.

At this point it should be stressed that the fluid-actuated piston 22 keeps the locking element constantly pushed, and that the upper surface 30 of the end 29 constantly remains in contact against the corresponding upper wall of the hole 28, as seen in figure 3.

This provides constant recovery of the plays which may form between the surfaces, since contact between the inclined surfaces is kept constant with respect to the advancement direction of the locking element 20.

With reference now to the above mentioned figures 6 to 8, in a second embodiment, suitable for small buckets, there is again a support 110 comprising a metal plate 111 with parallel wings 112 and hook-like ends 113 with a half-shell 114 to be coupled to the pivot 126, welded between the second wings 125.

There are again cross-members 115, 116 and 117 between the first wings 112, as well as a block 118 with a hole 119 in which a locking element 120 can slide, but now said locking element is associated with a threaded axial pin 122a which, by

passing through a tab 123, screws in said tab and supports an elastic means 122, such as a rubber bushing, which keeps the locking element 120 constantly pushed so that it protrudes from the cross-member 115.

There are again a cross-member 127 between the second wings 125 and a hole 128 passing through said cross-member, and the inclined (chamfered) upper surface 130 of the end 129 of the locking element 120 and the upper wall of the hole 128 again mutually couple.

The elastic pusher means 122 act only in one direction, and due to this reason a perpendicular pin 132 is fixed on said locking element 120 by means of a screw 131 passing through it in an axial through hole; said pin 132 protrudes from a slotted hole 133 of the plate 111.

Another pin 134 is welded to said plate 111.

A lever-like tool 135, as shown in figure 8, is suitable to use the pin 134 as a fulcrum and to push backward the pin 132, compressing the rubber-type bushing and moving the locking element 120 so that it disengages from the hole 128.

In practice it has been observed that the intended aims of the present invention have been achieved.

The invention thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, so long as they are compatible with the contingent use, as well as the dimensions, may be any according to the requirements.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

## Claims

1. Quick coupling comprising: a support (10; 110) which can be fixed to the power arm of an earth-mover; elements (12; 112) with a hook-like end (13; 113), suitable to fit between the upper part of a bucket (24) or the like and a transverse pivot (26; 126) thereof, extending on one side from said arm; and means (20, 22, 28; 120, 122, 128) for fixing to the bucket or the like extending on the opposite side from said arm; said coupling being characterized in that said fixing means comprise a locking element (20; 120) slidably coupled to said sup-

port and coupled to means (22; 122) suitable to push it so that it fits with one end (29; 129) in a corresponding seat (28; 128) of a cross-member (27; 127) protruding from the upper part of said bucket or the like, said end having, on the same side as said support, an inclined surface (30; 130) suitable to rest against a corresponding inclined surface of said seat (28; 128).

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2. Coupling according to claim 1, characterized in that said locking element (20; 120) is slideably coupled to said support in a direction substantially parallel thereto and to said upper part of said bucket or the like.

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3. Coupling according to claim 2, characterized in that said locking element can slide in a block (18; 118) welded to said support.

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4. Coupling according to one or more of the preceding claims, characterized in that said means suitable to push said locking element are constituted by a fluid-actuated and/or pneumatic piston (22) and/or equivalent means.

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5. Coupling according to claims 1 to 3, characterized in that said means suitable to push said locking element are constituted by elastic means (122), such as a rubber-type bushing or equivalent means.

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6. Coupling according to one or more of the preceding claims, characterized in that said cross-member (27; 127) protruding from the upper part of said bucket or the like is arranged at an angle with respect to the ideal line perpendicular to said sliding direction of said locking element, said seat (28; 128) being formed by a through hole of said cross-member which is at right angles to its larger surfaces.

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7. Coupling according to one or more of the preceding claims, characterized in that said inclined surface (30; 130) of said end of said locking element is constituted by a chamfer.

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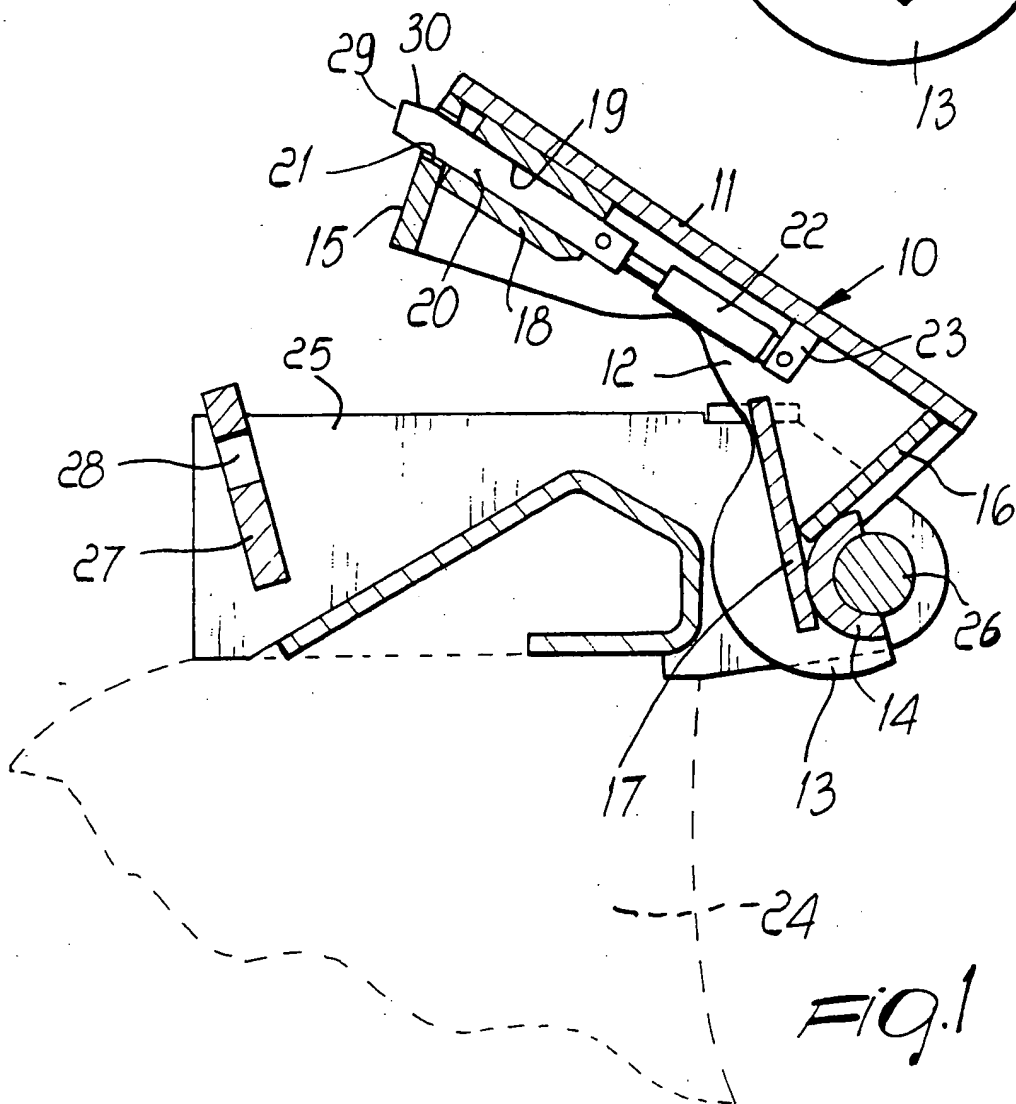
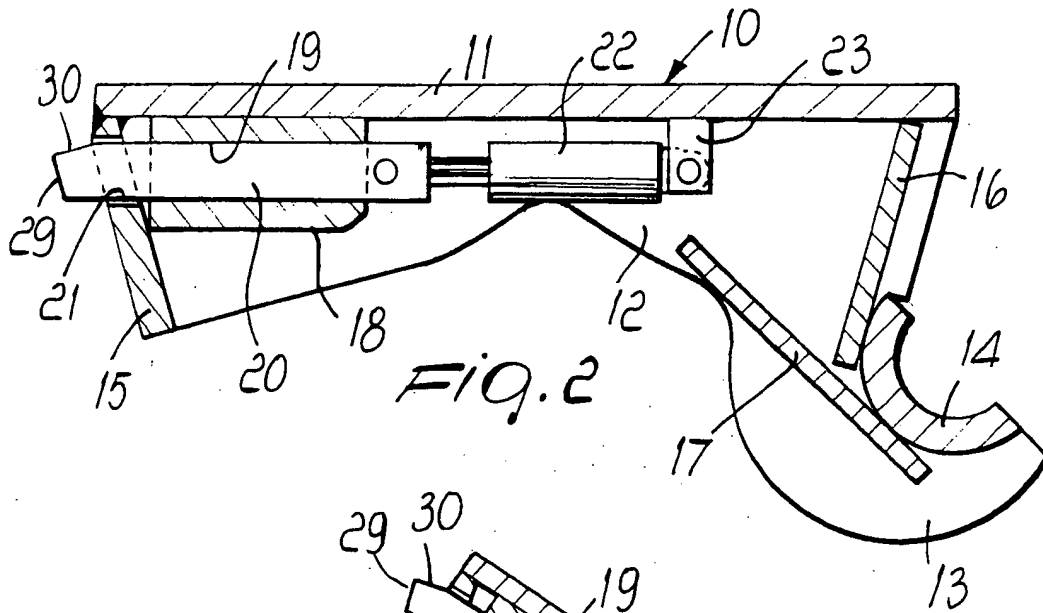
8. Coupling according to one or more of the preceding claims, characterized in that said corresponding inclined surface of said seat is constituted by the upper wall of said through hole.

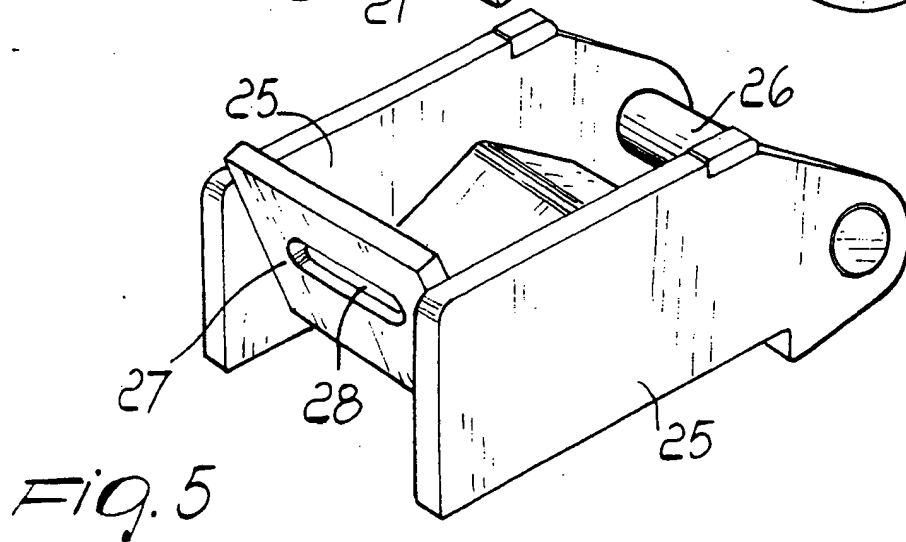
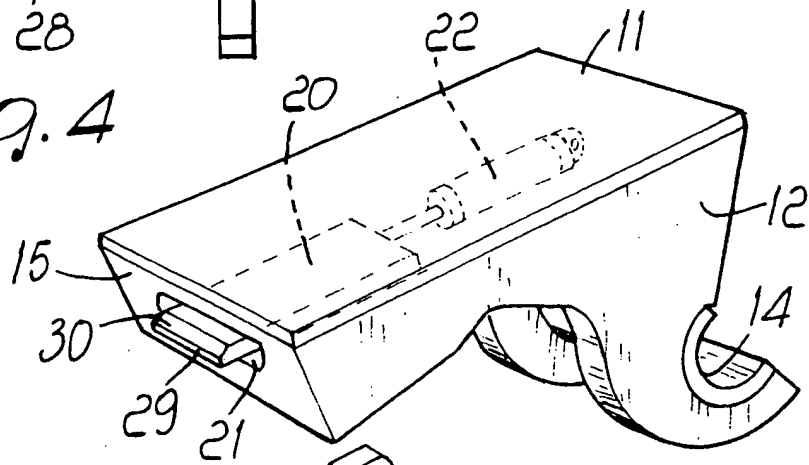
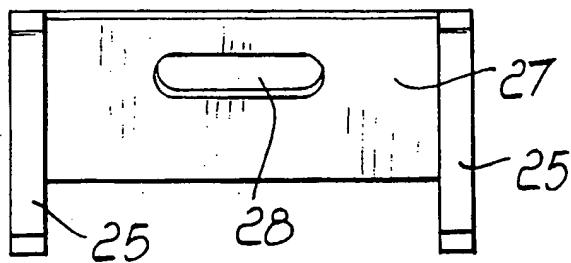
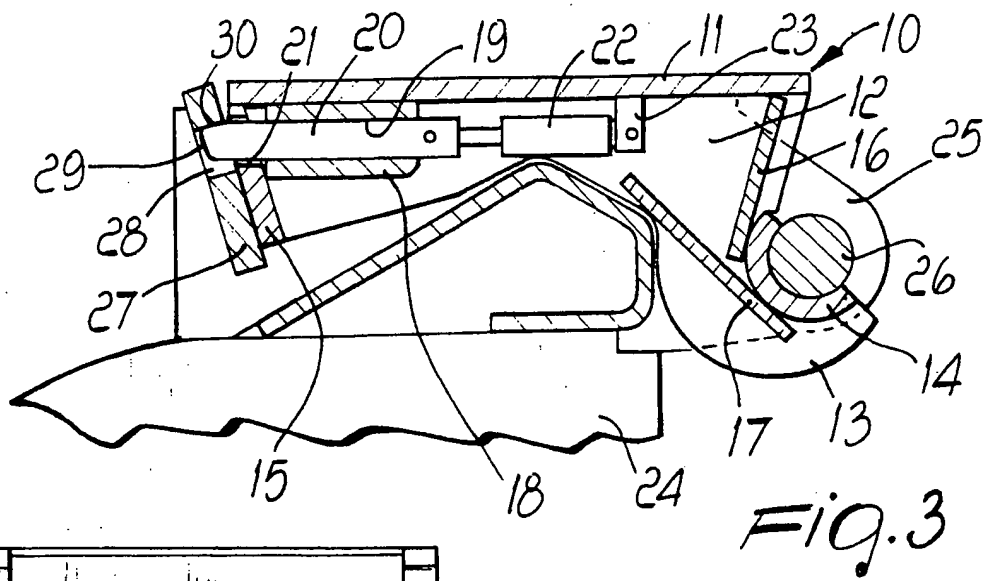
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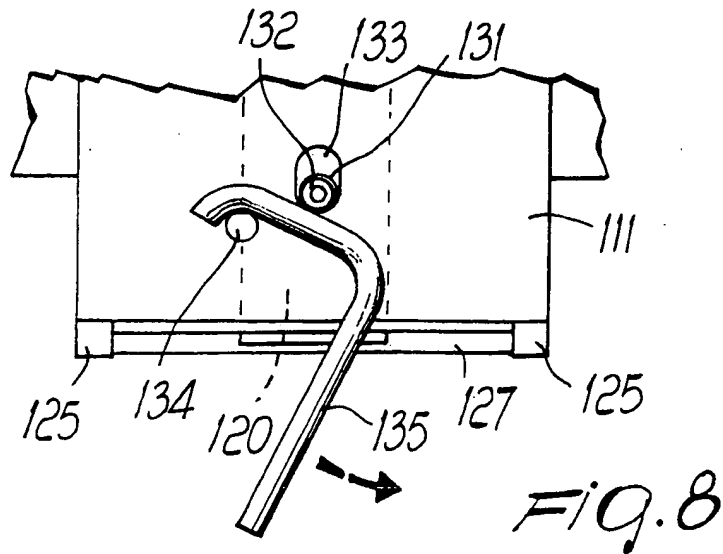
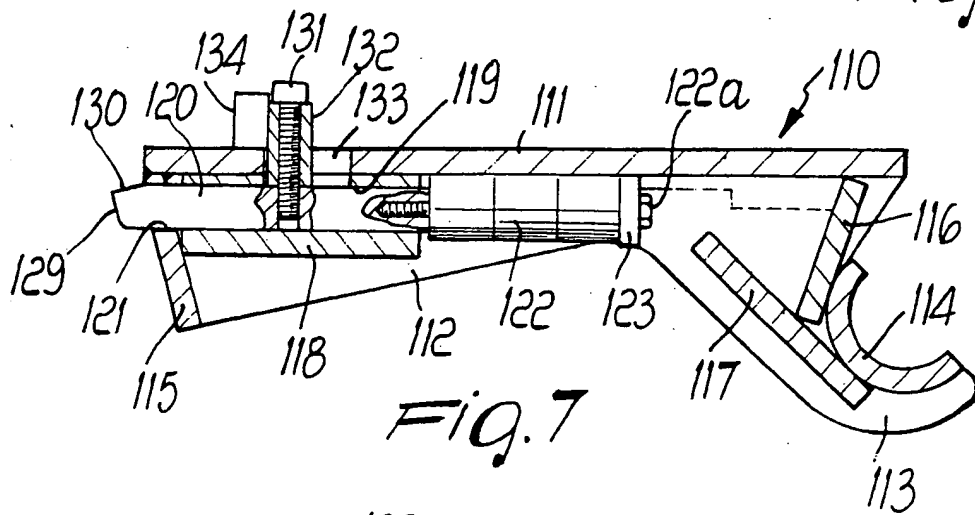
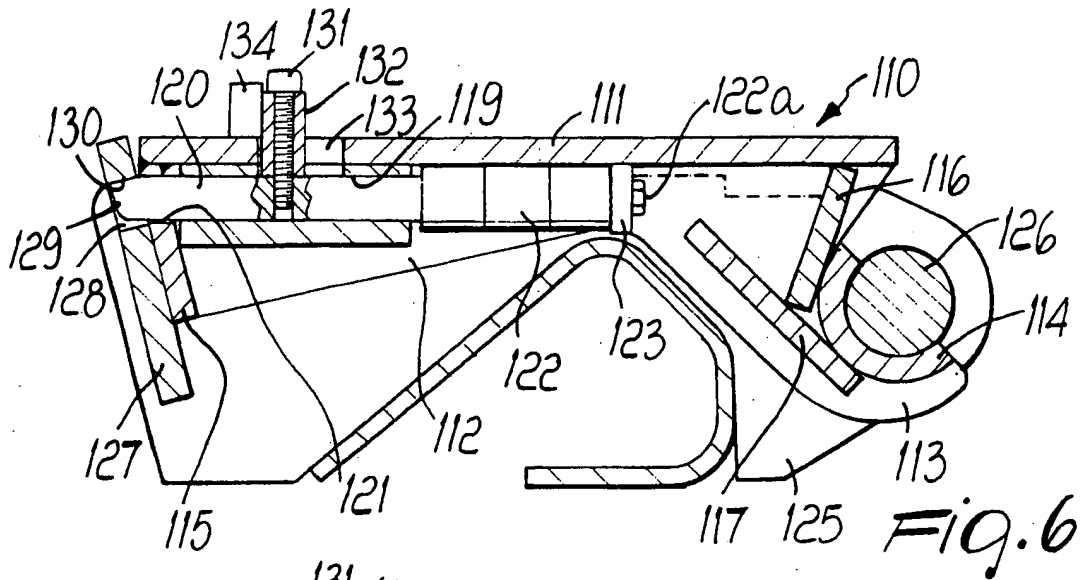
9. Coupling according to claim 5, characterized in that it comprises a pin (134) welded to said support and a pin (132) fixed to said locking

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element, a lever element (135) acting on said pins and being suitable to use one of them as fulcrum and apply a manual thrust on the other in contrast with said elastic means.









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## EUROPEAN SEARCH REPORT

Application Number  
EP 93 11 4408

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X A	EP-A-0 143 074 (FREDI STURY AG) * the whole document * ---	1-7 8,9	E02F3/36
X	EP-A-0 273 828 (G. PONCIN) * the whole document * ---	1-5,7,8	
X	GB-A-2 239 445 (T.F.F. HODGES) * the whole document * -----	1-3,5,8, 9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			E02F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 June 1994	Examiner Estrela y Calpe, J
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